

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A sensor system for detecting an effector or cofactor, comprising an aggregate, wherein the aggregate comprises a plurality of complexes, and each complex comprises:

- (a) a nucleic acid enzyme, comprising a cofactor binding site and optionally an effector binding site;
- (b) a substrate[[s]] for the nucleic acid enzyme, comprising a first polynucleotide[[s]];
- (c) a first [[set of]] particle[[s]] comprising a second polynucleotide[[s]], wherein the polynucleotide[[s are]] is attached to the particle[[s]] at the 3' terminus; and
- (d) a second [[set of]] particle[[s]] comprising a third polynucleotide[[s]], wherein the polynucleotide[[s are]] is attached to the particle[[s]] at the 5' terminus;

wherein the substrate hybridizes to the second polynucleotide and the third polynucleotide, so that the first particle and the second particle are in a tail-to-tail arrangement,

the nucleic acid enzyme is hybridized to the substrate between the second polynucleotide and the third polynucleotide, and

the nucleic acid enzyme cleaves the substrate in the presence of the cofactor and optionally the effector

~~the first polynucleotides comprise or are at least partially complementary to the second polynucleotides,~~

~~the first polynucleotides comprise or are at least partially complementary to the third polynucleotides,~~

~~and a mixture of (a) the nucleic acid enzyme, (b) the substrates, (c) the first set of particles, and (d) the second set of particles, will form aggregates of the first and second sets of particles, and formation of the aggregates will be at least 95% complete 10 minutes after the mixing.~~

2. (Original) The sensor system of claim 1, wherein the nucleic acid enzyme comprises DNA.

3. (Currently amended) The sensor system of claim 2, wherein the first [[set of]] particle[[s]] and the second [[set of]] particle[[s]] comprise gold.

4. (Currently amended) The sensor of claim 2, wherein the first [[set of]] particle[[s]] and the second [[set of]] particle[[s]] comprise a material selected from the group consisting of metals, semiconductors and latex.

5. (Original) The sensor of claim 2, wherein the effector or cofactor is selected from the group consisting of nitrogen fertilizers, pesticides, dioxin, phenols, 2,4-dichlorophenoxyacetic acid, Pb(II), Hg(II), As(III), UO₂(II), Fe(III), Zn(II), Cu(II), Co(II), glucose, insulin, hCG-hormone, HIV, HIV proteins, anthrax, small pox, nerve gases, TNT, DNT, cocaine and antibiotics.

6 - 41. (Cancelled)

42. (Currently amended) The sensor system of claim 2, wherein the second [[set of particles have]] particle has an average diameter of at least 30 nm.

43. (Currently amended) The sensor system of claim 2, wherein the second [[set of particles have]] particle has an average diameter of at least 35 nm.

44. (Previously presented) The sensor system of claim 2, further comprising a buffer.

45. (Previously presented) The sensor system of claim 44, wherein the buffer is selected to have a pH of 6.2 to 10.2.

46. (Previously presented) The sensor system of claim 45, wherein the buffer is selected to have a pH of 7.2 to 9.2.

47. (Previously presented) The sensor system of claim 2, wherein components of the sensor system are in an aqueous solution having an ionic strength of at least 0.20.

48. (Previously presented) The sensor system of claim 2, wherein the nucleic acid enzyme is present at a concentration of at least 0.2 μ M.

49. (Currently amended) The sensor system of claim 2, wherein the first polynucleotide[[s are]] is present at a concentration of at least 1.5 nM.

50 – 56. (Canceled)

57. (Currently amended) A sensor system for detecting an effector or cofactor, comprising an aggregate, wherein the aggregate comprises a plurality of complexes, and each complex comprises:

(a) a nucleic acid enzyme, comprising a cofactor binding site and optionally an effector binding site;

(b) a substrate[[s]] for the nucleic acid enzyme, comprising a first polynucleotide[[s]];

(c) a first [[set of]] particle[[s]] comprising a second polynucleotide[[s]], wherein the polynucleotide[[s are]] is attached to the particle[[s]] at the 3' terminus; and

(d) a second [[set of]] particle[[s]] comprising a third polynucleotide[[s]], wherein the polynucleotide[[s are]] is attached to the particle[[s]] at the 5' terminus;

~~wherein the first polynucleotides comprise or are at least partially complementary to the second polynucleotides,~~

~~the first polynucleotides comprise or are at least partially complementary to the third polynucleotides, and~~

the substrate hybridizes to the second polynucleotide and the third polynucleotide, so that the first particle and the second particle are in a tail-to-tail arrangement,

the nucleic acid enzyme is hybridized to the substrate between the second polynucleotide and the third polynucleotide,

the nucleic acid enzyme cleaves the substrates in the presence of the cofactor and optionally the effector, and

the second [[set of]] particle[[s have]] has an average diameter of at least 30 nm[[,]]

~~and a mixture of (a) the nucleic acid enzyme, (b) the substrates, (c) the first set of particles, and (d) the second set of particles, will form aggregates of the first and second sets of particles, and formation of the aggregates will be at least 95% complete 10 minutes after the mixing.~~

58. (Currently amended) The sensor system of claim 57, wherein the second [[set of particles have]] particle has an average diameter of at least 35 nm.

59. (Previously presented) The sensor system of claim 57, wherein the nucleic acid enzyme comprises DNA.

60. (Currently amended) The sensor system of claim 57, wherein the first [[set of]] particle[[s]] and the second [[set of]] particle[[s]] comprise gold.

61. (Currently amended) The sensor of claim 57, wherein the first [[set of]] particle[[s]] and the second [[set of]] particle[[s]] comprise a material selected from the group consisting of metals, semiconductors and latex.

62. (Previously presented) The sensor of claim 57, wherein the effector or cofactor is selected from the group consisting of nitrogen fertilizers, pesticides, dioxin, phenols, 2,4-dichlorophenoxyacetic acid, Pb(II), Hg(II), As(III), UO₂(II), Fe(III), Zn(II), Cu(II), Co(II), glucose, insulin, hCG-hormone, HIV, HIV proteins, anthrax, small pox, nerve gases, TNT, DNT, cocaine and antibiotics.

63. (Previously presented) The sensor system of claim 57, further comprising a buffer.

64. (Previously presented) The sensor system of claim 63, wherein the buffer is selected to have a pH of 6.2 to 10.2.

65. (Previously presented) The sensor system of claim 64, wherein the buffer is selected to have a pH of 7.2 to 9.2.

66. (Previously presented) The sensor system of claim 57, wherein components of the sensor system are in an aqueous solution having an ionic strength of at least 0.20.

67. (Previously presented) The sensor system of claim 57, wherein the nucleic acid enzyme is present at a concentration of at least 0.2 μM .

68. (Currently amended) The sensor system of claim 57, wherein the first polynucleotide[[s are]] is present at a concentration of at least 1.5 nM.

69. (Previously presented) The sensor of claim 2, wherein the effector or cofactor is a heavy metal ion.

70. (Canceled)

71. (Previously presented) The sensor of claim 57, wherein the effector or cofactor is a heavy metal ion.